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Systems and Methods for Big and Unstructured Data Project

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1 | Chapter one

In this chapter additional useful information are reported.

1.1. Sections and subsections

Chapters are typically subdivided into sections and subsections, and, optionally, sub-subsections, paragraphs and subparagraphs. All can have a title, but only sections and subsections are numbered. A new section is created by the command

`\section{Title of the section}`

The numbering can be turned off by using `\section*{}`.
A new subsection is created by the command

`\subsection{Title of the subsection}`

and, similarly, the numbering can be turned off by adding an asterisk as follows

`\subsection*{}`

1.2. Equations

This section gives some examples of writing mathematical equations in your thesis.

Maxwell's equations read:

$$
\begin{cases}
\nabla \cdot \boldsymbol{D} = \rho, & \text{(1.1a)} \\
\nabla \times \boldsymbol{E} + \dfrac{\partial \boldsymbol{B}}{\partial t} = \boldsymbol{0}, & \text{(1.1b)} \\
\nabla \cdot \boldsymbol{B} = 0, & \text{(1.1c)} \\
\nabla \times \boldsymbol{H} - \dfrac{\partial \boldsymbol{D}}{\partial t} = \boldsymbol{J}. & \text{(1.1d)}
\end{cases}
$$

Equation (1.1) is automatically labeled by `cleveref`, as well as Equation (1.1a) and Equation (1.1c). Thanks to the `cleveref` package, there is no need to use `\eqref`.

Remember that Equations have to be numbered only if they are referenced in the text.

Equations (1.2), (1.3), (1.4), and (1.5) show again Maxwell's equations without brace:

$$\nabla \cdot \boldsymbol{D} = \rho, \tag{1.2}$$

$$\nabla \times \boldsymbol{E} + \frac{\partial \boldsymbol{B}}{\partial t} = \boldsymbol{0}, \tag{1.3}$$

$$\nabla \cdot \boldsymbol{B} = 0, \tag{1.4}$$

$$\nabla \times \boldsymbol{H} - \frac{\partial \boldsymbol{D}}{\partial t} = \boldsymbol{J}. \tag{1.5}$$

Equation (1.6) is the same as before, but with just one label:

$$\begin{cases} \nabla \cdot \boldsymbol{D} = \rho, \\ \nabla \times \boldsymbol{E} + \dfrac{\partial \boldsymbol{B}}{\partial t} = \boldsymbol{0}, \\ \nabla \cdot \boldsymbol{B} = 0, \\ \nabla \times \boldsymbol{H} - \dfrac{\partial \boldsymbol{D}}{\partial t} = \boldsymbol{J}. \end{cases} \tag{1.6}$$

1.3. Figures, Tables and Algorithms

Figures, Tables and Algorithms have to contain a Caption that describe their content, and have to be properly reffered in the text.

1.3.1. Figures

For including pictures in your text you can use `TikZ` for high-quality hand-made figures, or just include them as usual with the command

`\includegraphics[options]{filename.xxx}`

Here xxx is the correct format, e.g. `.png`, `.jpg`, `.eps`, ...

Figure 1.1: Caption of the Figure to appear in the List of Figures.

Thanks to the `\subfloat` command, a single figure, such as Figure 1.1, can contain multiple sub-figures with their own caption and label, e.g. Figure 1.2a and Figure 1.2b.
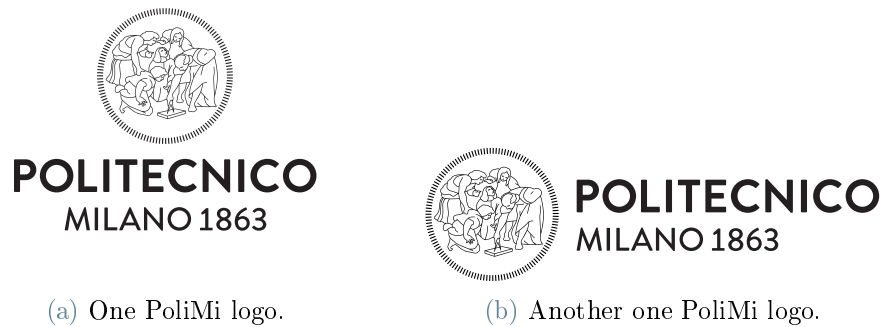

(a) One PoliMi logo.

(b) Another one PoliMi logo.

Figure 1.2: This is a very long caption you don't want to appear in the List of Figures.

1.3.2. Tables

Within the environments `table` and `tabular` you can create very fancy tables as the one shown in Table 1.1.

Title of Table (optional)

	column 1	column 2	column 3
row 1	1	2	3
row 2	α	β	γ
row 3	alpha	beta	gamma

Table 1.1: Caption of the Table to appear in the List of Tables.

You can also consider to highlight selected columns or rows in order to make tables more

readable. Moreover, with the use of `table*` and the option `bp` it is possible to align them at the bottom of the page. One example is presented in Table 1.2.

	column1	column2	column3	column4	column5	column6
row1	1	2	3	4	5	6
row2	a	b	c	d	e	f
row3	α	β	γ	δ	ϕ	ω
row4	alpha	beta	gamma	delta	phi	omega

Table 1.2: Highlighting the columns

	column1	column2	column3	column4	column5	column6
row1	1	2	3	4	5	6
row2	a	b	c	d	e	f
row3	α	β	γ	δ	ϕ	ω
row4	alpha	beta	gamma	delta	phi	omega

Table 1.3: Highlighting the rows

1.3.3.   Algorithms

Pseudo-algorithms can be written in LaTeX with the `algorithm` and `algorithmic` packages. An example is shown in Algorithm 1.1.

Algorithm 1.1 Name of the Algorithm

1: Initial instructions
2: **for** $for - condition$ **do**
3:     Some instructions
4:     **if** $if - condition$ **then**
5:         Some other instructions
6:     **end if**
7: **end for**
8: **while** $while - condition$ **do**
9:     Some further instructions
10: **end while**
11: Final instructions

1.4. Theorems, propositions and lists

1.4.1. Theorems

Theorems have to be formatted as:

Theorem 1.1. *Write here your theorem.*

Proof. If useful you can report here the proof.

1.4.2. Propositions

Propositions have to be formatted as:

Proposition 1.1. *Write here your proposition.*

1.4.3. Lists

How to insert itemized lists:

- first item;
- second item.

How to insert numbered lists:

1. first item;
2. second item.

A | Appendix A

If you need to include an appendix to support the research in your thesis, you can place it at the end of the manuscript. An appendix contains supplementary material (figures, tables, data, codes, mathematical proofs, surveys, ...) which supplement the main results contained in the previous chapters.

List of Figures

List of Tables